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INFECTIVITY OF ANOPHELES CRUCIANS IN NATURE.

Reports of interest are given in the two papers which follow. Biologist Bruce Mayne records the finding for the first time of an *Anopheles crucians* infected with malaria parasites under natural conditions. Mr. Mayne's work was done in 1917.

Asst. Surg. Gen. H. R. Carter in a memorandum has especially pointed out two other points of importance brought out in this paper: (1) The percentage of infection found in *Anopheles quadrimaculatus* in nature (i. e., in "wild" specimens), a statement which has not heretofore been recorded, and (2) the latest date at which *quadrimaculatus* has been found to be infected. This latter point, he states, is of considerable sanitary importance, since it was used to determine the date at which the service stopped oiling last autumn, entailing a saving of about \$10,000.

Mr. Mayne's report acquires increased significance when combined with the corroborating observations made by Dr. Metz, who, in 1918, found two specimens of *Anopheles crucians* infected in nature.

The Occurrence of Malaria Parasites in *Anopheles Crucians* in Nature: Percentage of Infection of *Anopheles Quadrimaculatus* and Latest Date Found Infected in Northern Louisiana.

By BRUCE MAYNE, Biologist, United States Public Health Service.¹

The finding of maturely developed *Plasmodium* in the gut wall or salivary glands in artificially infected mosquitoes kept under laboratory conditions has been held by numerous investigators as ample proof of the susceptibility of a species as an efficient host. The three American species of *Anopheles*, namely, *A. quadrimaculatus*, *A. punctipennis*, and *A. crucians*, have been reported as capable of harboring the organisms of malarial fever under experimental conditions. Several workers have discovered American *Anopheles* in the rôle of carriers under natural environments. Within the past few years *Anopheles quadrimaculatus* has been found both with oocyst infection of the gut and with salivary gland sporozoites. On only one occasion a specimen of *A. punctipennis* has been found in nature with stomach infection, and that with a single oocyst. *A. crucians*, which is first reported by the writer as a host of *Plasmodium vivax*

¹ The author's name has been legally changed; it was formerly M. Bruin Mitzmain.

and *P. falciparum* under laboratory procedure, has never before been found infected in the natural state.

The main purpose of this article is to report the finding of *A. crucians* infected in the field. During the summer and fall of 1917 malaria investigations were conducted in northern Louisiana at Lenwil, a lumber settlement six miles west of Monroe. The infected specimen of *A. crucians*, specimen number 15, was captured on October 11 from a privy of a negro resident at Lenwil. The gut wall of this mosquito was negative. The six lobes of the salivary glands were moderately infested with sporozoites which showed active motility under pressure of the cover glass.

The percentage of infection presented by the 20 specimens of *A. crucians* dissected was 5, but it is assumed that too few mosquitoes of this species were examined to furnish a comprehensive relation of percentages. It is pointed out, however, that the finding of the single infected specimen of *A. crucians* is significant on account of the presence of viable gland sporozites.

A preliminary survey at Lenwil among 250 mill employees and their families gave a history index of malaria infections of 83 per cent and a parasite index of 22 per cent. On August 27, two collected specimens of *A. quadrimaculatus* were shown to be infected. Dissections of anopheline mosquitoes were continued without interruption until the latter part of November. The last infected mosquito was captured October 20.

The following table indicates the dates of collecting the mosquitoes which proved upon dissection to be harboring organisms of malaria:

TABLE 1.—Dates collected, species and number of each found to be infected.

Date dissected.	Number of specimens.			Specimens found infected.		
	Quadri- macu- latus.	Puncti- pennis.	Cru- cians.	Quadri- macu- latus.	Puncti- pennis.	Cru- cians.
1917.						
Aug. 23-26.....	46		1			
Aug. 27.....	29	1		2		
Aug. 29.....	3					
Aug. 30.....	3					
Aug. 31.....	20		1			
Sept. 1.....	11			1		
Sept. 6.....	8					
Sept. 7.....	24			1		
Sept. 8.....	8					
Sept. 10.....	5					
Sept. 11.....	10					
Sept. 13.....	39			1		
Sept. 14-20.....	125					
Sept. 22.....	40			1		
Sept. 24-Oct. 4.....	155	1				
Oct. 6.....	10			4		
Oct. 7.....	5			1		
Oct. 8.....	17			2		
Oct. 10.....	13					
Oct. 11.....	9		1	1		1
Oct. 12.....	9			1		
Oct. 15.....	20	1	1	1		
Oct. 16-19.....	31	1				
Oct. 20.....	2			1		
Oct. 22-Nov. 25.....	67	13	16			
Total.....	709	17	20	17		1

The percentage of infection found among the 709 specimens of *A. quadrimaculatus*, namely, 2.4, appears to be fairly constant in all our field dissections thus far conducted.

TABLE 2.—*Descriptions of the extent of infection in the specimens of A. quadrimaculatus.*

Specimen No.	Date dissected.	Infected stomach wall.	Salivary gland sporozoites.
1	Aug. 27.....	.....	1 lobe infected slightly.
2	Aug. 28.....	.....	2 lobes infected; 1 slightly, 1 moderately.
3	Sept. 1.....	A single oocyst presporoblastic without pigment.	
4	Sept. 7.....	7 oocysts in young stages of development; pigment present.	
5	Sept. 13.....	3 oocysts presporoblastic.....	
6	Sept. 22.....		2 lobes of 6 heavily infected.
7	Oct. 6.....		1 lobe infected slightly.
8	.....do.....		4 lobes, moderate infection.
9	.....do.....		2 lobes, moderate infection.
10	.....do.....		1 lobe, heavily infected.
11	Oct. 7.....		6 lobes, moderate infection.
12	Oct. 8.....		6 lobes with numerous sporozoites.
13	.....do.....		4 lobes, scanty infection.
14	Oct. 11.....		6 lobes, moderate infection.
16	Oct. 12.....		2 mid lobes, scant infection.
17	Oct. 15.....		6 lobes, moderate to heavy infection.
18	Oct. 20.....		4 lobes, moderate infection.

ANOPHELES CRUCIANS WIED. AS AN AGENT IN MALARIA TRANSMISSION.

By C. W. Merz, Ph. D., Special Investigator, United States Public Health Service.

So far as the writer is aware there is little published evidence upon which to judge the importance of *Anopheles crucians* Wied. as a vector of malaria in nature. The species is known to be a suitable host for the parasite of æstivo-autumnal and tertian malaria (Mitzmain, 1916 (a), (b)) and to transmit at least the former type under laboratory conditions (Mitzmain 1916 (a), King 1916), but no available literature records the finding of infected specimens in nature. Beyer and his coworkers and Dupree are reported by various authors to have found cases of this sort, but the reports are, according to King (1916), based upon a misinterpretation of the statements of these investigators.

Epidemiological considerations and observations on the habits of *crucians* have led to indefinite conclusions. According to King the incrimination of *crucians* by Beyer and his associates was based upon epidemiological findings. On the other hand the apparent absence of any marked tendency on the part of *crucians* to enter dwellings has argued against its efficiency as a vector. It may be considered a relatively open question, therefore, whether *crucians* is or is not of practical importance—certainly the question is not yet settled.

In arriving at a conclusion in this case it is of primary importance to determine the relative frequency with which *crucians* bites man under conditions suitable for malaria transmission. The present